

ACTIVE MATERIAL ACTIVATED COVER

BACKGROUND

[0001] The present disclosure relates to shades, covers, screens, partitions, and the like, and more particularly, to shades, covers, screens, partitions, and so forth, that employ active materials.

[0002] There are many sunshade designs, inside and outside a vehicle, that are deployed manually or automatically. Outside vehicle designs have a big impact on the exterior appearance of the vehicles. For sunshades placed inside of vehicles, most of them are foldable or collapsible and users deploy or fold them manually. The deployment or folding takes time and is inconvenient. It also takes some space to store them. Some interior systems have semi-permanent frames onto which the flexible shades are attached. Users also need to deploy and wind them up manually although the effort is less. The frames also have an impact on the interior appearance of vehicles. For cargo covers or partition screens, they are mostly manually deployed/retrieved or fixed in place. These exhibit similar disadvantages as existing sunshade designs.

[0003] The ability of deploying and stowing achieved in previous arts provides improved convenience, reduced operation time, and reduced effort, but uses electromechanical and electrohydraulic means of actuation. These means add weight, volume, cost, and noise, and possibilities of failure. Hence, there is constantly a need in the art for improved activation mechanisms for cover devices.

BRIEF SUMMARY

[0004] Disclosed herein are cover systems and methods for using the cover systems.

[0005] In one embodiment, a cover system can comprise: a cover and an active material component in operable communication with the cover. The active material component can comprise an active material that enables the deployment and retraction of the cover.

[0006] The above described and other features are exemplified by the following figures and detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Refer now to the figures, which are exemplary embodiments and wherein the like elements are numbered alike.

[0008] FIG. 1 is a frontal view of one embodiment of a window with a cover and using shape memory material(s).

[0009] FIG. 2 is a side view of the embodiment of FIG. 1.

[0010] FIGS. 3 and 4 illustrate another embodiment of a window with a cover that uses a mechanism for holding the cover adjacent to the window.

[0011] FIG. 5 is a schematic illustrating an embodiment of a scrolling mechanism, e.g., for large rotational displacement.

[0012] FIG. 6 is an illustration of one embodiment of a partition screen that can be deployed/retracted via shape memory material's based mechanisms that produce large rotational displacement.

[0013] FIG. 7 is a schematic end view illustration of another embodiment of a shape memory material actuator assembly.

[0014] FIG. 8 is a schematic perspective illustration of the shape memory material actuator assembly of FIG. 7 showing an opposing end.

[0015] FIG. 9 is a perspective illustration of one embodiment of an angular to linear displacement conversion mechanism.

[0016] FIG. 10 illustrates an embodiment of a cover deployment mechanism using a large linear displacement with a shape memory material located around a window.

[0017] FIG. 11 is a schematic perspective of another embodiment of a shape memory material actuator assembly.

[0018] FIG. 12 is a schematic perspective illustration in cross-sectional view of the actuator assembly of FIG. 11.

[0019] FIG. 13 is a schematic fragmentary, cross-sectional view of the actuator assembly of FIGS. 11 and 12 with some of the shape memory material components activated and the movable members locked together.

[0020] FIG. 14 is a frontal view of an embodiment containing interfering slats showing the slats in closed position.

[0021] FIG. 15 is a frontal view of the interfering slats of FIG. 14 in an open position.

[0022] FIG. 16 is a frontal view of one embodiment of a sliding rod inside tube mechanism for a sunshade deployment.

[0023] FIG. 17 is a frontal view of one embodiment of a jack mechanism for a sunshade deployment.

DETAILED DESCRIPTION

[0024] The following description of the embodiments is merely exemplary in nature and is in no way intended to limit the disclosure, its application, or uses.

[0025] The ability to deploy and stow achieved here (e.g., remotely on-demand, or automatically based on software logic operating on sensor input, or strictly passively based on changes in the operating environment (such as temperature and applied load)) provides improved convenience, reduced operation time, reduced effort, and both smooth and quiet (both acoustically and in terms of electromotive force (emf)) operation. In addition, benefits associated with using active materials in place of electromechanical and electrohydraulic actuation also include reduction in actuator size, weight, volume, and cost and an increase in robustness. The deploying and stowing technology can be employed with sunscreens, sun sheets, sunshades, interfering window slats (also known as "blinds"), covers (e.g., cargo bed cover, storage well/bin cover, and glazing area cover), partitions (e.g., screening, security, protective, and privacy), barriers (e.g., sound, thermal, light, fluid (e.g., moisture, gas, liquid), and/or weather), and the like (hereinafter referred to as "cover"). For example, the cover can be configured as a security barrier, protective barrier, privacy barrier, sound barrier, thermal barrier, light barrier, fluid barrier, weather barrier, and so forth, as well as combinations comprising at least one of the foregoing barriers.

[0026] In some embodiments, existing window glass moving mechanisms can be used with active materials to help attach or detach a cover (e.g., sun shade screen or sheet) to window glasses. These mechanisms can employ the reversible shape, stiffness, and/or shear strength change capabilities of different classes of active materials. In another embodiment, the reversible shape change capability is used to pull or wind/unwind a scroll to deploy and/or stow the cover utilizing large displacements.

[0027] In one embodiment, a cover system comprises: a cover configured to be disposed near a glazing area (e.g., window (such as in a vehicle (car, truck, train, airplane, boat, bus, etc.), building, and so forth), sunroof, windshield, etc.),